reheating furnace for ingots and billets was solved in a very satisfactory manner by the designer of the American Morgan furnace, which has a descending roof (Fig. 31, 32 and 33). It is rather interesting to know that Morgan was not led to construct his furnace in this manner by consideration of the circulation of the heated gases, but simply because it was found more convenient to push the ingots up a sloping skid. The ingots remained in contact with one another when heated on skids with an upward slope, a condition which was difficult to maintain when the skids were level or sloped downward. It has been found that this construction with a roof sloping downward from the firebox end of the furnace to the end at which the waste gases are taken off and where the cold ingots enter the furnace is the very best solution of the continuous reheating furnace problem.

It may be seen in Fig. 33 that producer gas at a high temperature (1000° or thereabouts) and secondary air heated in recuperators enter the combustion chamber. Here the mixture is burned, and the products of combustion, as they give up their heat, pass under the descending roof between the ingots resting on the water-cooled pipe skids, and descend into the recuperator tubes.

In this furnace, the ingots are literally plunged into the hot gases. The model which has been made shows, when immersed in water and traversed by the stream of colored kerosene, that there will be no drawing in of cold air at the working doors, and that there will be no pockets of chilled and stagnant gases. On the contrary, the chilled gases fall upon a hearth a sufficient distance below the skids to insure the immersion of the ingots in a layer of hot gases, and from, this hearth the colder gases drain into the recuperator. The photograph, Fig. 31, was taken while the model was being filled with- kerosene. It shows extremely well how the hot incandescent gases from the flame fill the upper portion of the heating chamber in a horizontal layer which increases in thickness, and how these gases, as they cool, drop

lower by reason of their increase in weight. The cool gases fall away from the ingots as they give up their heat to them.

The idea of the descending roof for *continuous reheating furnaces* has come into general use in many plants.- In central Russia there may still be found a number of older furnaces which have roofs ascending from the firebox end, and some of which also have a downward inclination of the roof at the opposite end.